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by

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Contents

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I. Introduction*

Most Latin American countries relied to a large extent on foreign funds to finance their economic development in the seventies and eighties. However, important differences existed with respect to the structure of their capital inflows, the regulations affecting different types of inflows and their overall economic performance. The relative importance of debt finance and foreign direct investments (fdi) in total external liabilities differed significantly between major Latin American borrowers, such as Brazil, Chile and Mexico. In Chile, fdi accounted for only 12 per cent of total external liabilities in 1973 while the ratios were 37 and 23 per cent for Brazil and Mexico respectively (Appendix Table A3). On the other hand, it was only in Chile that the stock of fdi increased relative to total debt outstanding recently.

The three countries differed in terms of economic performance as well. In the 1973-85 period, real growth of gross domestic product amounted to an average annual rate of 5.5 per cent in Brazil. Mexico achieved a similar magnitude with 4.8 per cent, whereas real growth was significantly lower in Chile, reaching only 1.5 per cent annually.

Different capital structures and growth records may in fact be interrelated. This hypothesis refers to a choice-theoretic model which analyses the international transfer of capital on the basis of an agent-principal approach. It is shown that transfer negotiations between foreign lenders or investors (principals) and the authorities in the recipient country (agent) can result in a first-best "cooperative" or a second-best "non-cooperative" equilibrium (Lächler, 1985). The impact of capital inflows on economic performance of the recipient country depends on which of both regimes is realized. In a non-cooperative situation, the creditor fails to precommit himself credibly to a certain investment behaviour. This case can be considered as typicial for the recent past (Lächler, Nunnenkamp, 1987). Under non-cooperative condi-

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* Comments of Peter Nunnenkamp are gratefully acknowledged.

tions the choice between equity and debt finance may involve a risk-return trade-off between income stability and expected growth. A higher proportion of equity inflows reduces the variability of the agent's domestic absorption. At the same time, incentives to generate domestic savings are supposed to be weaker than in the case of debt finance. Consequently, future growth prospects are diminished.

Given the hypothesized relationship between the structure of capital inflows and economic performance, government policies towards different types of capital inflows come into focus. Typically government interventions not only influence the total amount of capital inflows, but also its structural composition. Indirectly capital inflow regulations are thus likely to influence economic performance as well. Moreover, government interventions may have a direct impact on the growth effects of different capital inflows insofar as the model assumptions on the investment behaviour of the agents are modified. Most importantly, the efficiency of investments financed through equity and debt inflows may be affected by regulations.

In the following, the predictions of the principal-agent model on the effects of different capital inflows on economic performance in Chile are subjected to an empirical test. Section II outlines the choice-theoretic model and clarifies whether transfer negotiations yielded a cooperative or non-cooperative equilibrium in the case of Chile. Chapter III analyses how Chilean policies affected the structure of capital inflows over the 1973-87 period and discusses the effects of regulations on the investment behaviour of the agent. In Section IV the impacts of different types of capital inflows on key macroeconomic variables is tested empirically. The results are interpreted within the agent-principal framework. The final chapter provides some policy conclusions, especially relating to recent attempts to change the structure of capital inflows structure in favour of equity.

II. Theoretical Framework

1. The Basic Model

Hypotheses on the impact of different types of capital inflows on economic performance in Chile can be derived from the following principal-agent framework. The relationship between foreign financing and domestic savings and investment is the subject of a long debate in the literature on development finance. Most empirical studies have concluded that an additional Dollar of foreign capital increases total saving by less than one Dollar[1]. However, the research focussed only on distinguishing the effects of private versus public transfers and aid versus external finance without grant elements. Contrary to previous investigations, the following model considers the impact of aid, debt, and foreign direct investment inflows on economic performance separately.

In the underlying model (Lächler 1985; Lächler, Nunnenkamp, 1987) the capital transfer between the lending (principal) and the recipient country (agent) is typically characterized by an informational asymmetry: Once the money is transferred, the principal does not know which proportion the agent invests in income generating activities. He merely observes total output which is not only a function of realized investment but also of random variables. As the agent allocates the transferred resources between consumption and investment the following disincentive (moral hazard) problems arise:

- In the case of equity participation, the agent can be expected to invest a smaller share of domestic absorption compared to a situation where foreign resources would be available in form of a gift. Since the principal is entitled to a predetermined share of future output, the agent may improve his own welfare position by shifting domestic absorption to current consumption.
- In the case of debt finance the principal is entitled to a fixed sum of debt service payments. Relative to a gift-transfer

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[1] For an overview of empirical studies which measured the effects of foreign capital on domestic savings, domestic investment and economic growth, see Sharma (1983).

the agent will then choose riskier projects. This is because it is favourable for the agent to raise the variance of returns from investments in order to maximize his own welfare at the expense of the principal.

In both cases moral hazard of the agent threatens tp reduce the expected gains for the principal. Assuming that principals behave rationally, they anticipate the agent's behaviour and modify the terms under which the transfer is made. The agent who receives foreign capital under these harder conditions is then forced to a non-cooperative investment behaviour. The aforementioned disincentive problems may be overcome, if the agent were able to precommit himself credibly to a certain investment behaviour. In such a cooperative environment the model hypothesizes that the investment response (I) to a transfer (T) obeys the following pattern

$$(1)\quad dI/dT\big|_{AID} \leq (dI/dT\big|_{Equity}, dI/dT\big|_{DEBT}), \text{with } 0 \leq dI/dT\big|_{AID} \leq 1$$

According to (1), the recipient country invests a relatively larger share if the transfer involves future repayment obligations. However, if the transfer negotiations result in a non-cooperative solution, the change in domestic investment after an increased equity inflow may be negative, while more external debt always leads to more investment. The capital inflows are expected to obey the following pattern:

$$(2)\quad dI/dT\big|_{Equity} \leq dI/dT\big|_{Aid} \leq dI/dT\big|_{Debt} \quad \text{with } 0 \leq dI/dT\big|_{Aid} \leq 1$$

According to the model the pattern of coefficient values - as given in (1) and (2) for investment - also holds for changes in economic growth and domestic savings (DS) in response to increased transfers. Real economic growth is assumed to be a stochastic function of investment. In the case of domestic savings the response to an aid inflow is bounded by $-1 \leq dDS/dT\big|_{Aid} \leq 0$ [1].

[1] This results from the definition of domestic savings which is DS = I-T.

2. The Transfer Negotiations in the Case of Chile

The expected impact of capital inflows on the agent's economic performance differs depending on the transfer regime. Hence, it is important to get an idea whether Chile engaged in cooperative or non-cooperative relations with foreign suppliers of capital. Whether or not a cooperative equilibrium is achieved, depends on the perception of the agent's investment behaviour by the principal. The agent may signal that he is prepared to engage in cooperative relations. The model suggests that high investment ratios, the concentration of investments in low-risk projects, and successful mobilization of domestic savings may provide such indications. However, unless the institutional framework of transfer negotiations allows for a credible precommitment to a certain behaviour, the outcome of transfer negotiations ultimately depends on the principal's expectations on the agent's future economic course. The principal decides on the terms of the capital transfer. This in turn determines the type of equilibrium reached.

Consequently, a non-cooperative environment is characterized by

- a relatively low savings and investment ratio,
- a concentration of investments in risky activities,
- high capital costs, i.e. high interest rate spreads in the case of external debt finance.

Judging from these indicators several arguments can be put forward that the transfer negotiations yielded a non-cooperative equilibrium in the case of Chile. Compared to the average of all developing countries, Chile's investment ratio was rather low in the 1973-85 period. Investment outlays (including changes in stocks) as percentage of gross domestic product (GDP) accounted for only 19 per cent in Chile while the ratio for all developing countries was 25 per cent over the same period[1]. The investment ratio averaged 22 per cent in the years 1975-76 when inflows of foreign direct investment (fdi) were relatively small. With mas-

[1] The data comes from IMF (1987) and Table 2.

sive fdi inflows in 1978-82 the investment ratio declined to 18 per cent. This suggests an inverse relationship between fdi and domestic investment, as hypothesized in a non-cooperative environment.

Domestic savings in Chile fell consistently short of investment in 1977-82. The savings ratio fluctuated around 11 per cent, whereas the ratio for all middle-income countries was relatively stable at 23.5 per cent over the same years[1]. The significant decline of domestic savings in 1981-82, when heavy capital inflows were reported, indicates a fairly strong substitution between capital inflows and domestic savings. In other words, external capital was not used to finance additional investments, but to allow for additional consumption.

The expropriations of foreign multinationals and the compensation negotiations[2] in the 1970-74 period strongly point to non-cooperative relations with foreign investors until 1975. This refers especially to the nationalization of the mining industry.

In the case of debt finance, Chile had to pay relatively high interest-rate spreads above LIBOR which strongly points to non-cooperative relations. The average spread for nine developing countries being classified as problem-borrowers was 1.3 percentage points above LIBOR over the 1977-81 period (Nunnenkamp, Junge, 1985, p. 57)[3]. During the same years Chile paid even higher spreads, namely 1.46 percentage points on average. Apparently, foreign creditors expected Chile to behave in a non-cooperative manner and thus required higher than average spreads.

As concerns the riskiness of investments, activities which generate foreign exchange and conform to the assumed comparative

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[1] For the data see World Bank, World Development Report, various issues.

[2] See Zabala (1987) for a description of the nationalization process in Chile.

[3] Those countries are: Argentina, Brazil, Chile, Mexico, Nigeria, the Philippines, Turkey, Venezuela, and Yugoslavia.

advantage of Chile may be supposed to be the least risky for foreign principals[1]. In the 1974-81 period, mining and manufacturing accounted for 76.8 per cent of total Chilean exports (Appendix Table A4). However, only 31.8 per cent of total foreign debt outstanding accrued to these two sectors. The concentration of debt in sectors with relatively small exports increased the risk for foreign lenders, since debt obligations may well exceed the foreign exchange which could generated by these sectors.

Moreover, Chilean investments were heavily concentrated in highly physical and human-capital intensive industries during the years 1979-82 (Appendix Table A5)[2]. Human capital intensive industries can safely be assumed to conflict with the comparative advantage of Chile. Being classified as upper-middle-income country, some physical capital intensive industries may be expected in Chile. However, considering the relatively low domestic savings ratio, the strong reliance on physical capital intensive industries is unlikely to be in line with Chile's comparative advantage as well.

All in all, it can thus be concluded that Chile maintained non-cooperative relations with its foreign principals. The investment response of capital inflows can be supposed to follow the pattern of equation (2). Foreign direct investment can be expected to involve the risk-return trade-off which was hypothesized under non-cooperative conditions.

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[1] The availability of foreign exchange is a precondition for debt service payments. Investment which do not confirm to Chile's comparative advantage may well be profitable in the short-run. They are nevertheless fairly risky. Unexpected policy shifts may significantly reduce the profitability of such investments. The liberalization of the financial market and external trade in Chile provides a case in point.

[2] Five physical capital-intensive industries accounted for almost 48 per cent of total gross fixed capital formation in manufacturing. Similarly, 25 per cent of all investments in manufacturing were realized in six highly human capital intensive industries.

III. Government Policies and Capital Inflows

1. The Relevance of the Regulation Framework

The predictions of the principal-agent model refer to the effects of different capital inflows on investment in the first place. Since economic growth is portrayed as a stochastic function of investment, the growth effects of external finance are supposed to follow the pattern of equation (2) as well. Implicitly it is assumed that all investments are equally efficient. Foreign capital inflows are considered as perfectly fungible (Lächler, 1985): Once the terms of transfers have been negotiated and transfers are made, the government agent can dispose of those funds for either consumption or investment purposes.

Actually, however, the government's leverage to determine the use and thus the efficiency of foreign capital inflows is likely to differ between the various types of external finance. The government agent can freely dispose of resources directly transferred to him, and immediately determines the efficiency of foreign aid and public debt for example. In the case of private debt and foreign direct investment, the government's control is less strict. Nevertheless the efficiency of fdi and private debt inflows can be influenced by the government. Public regulations may modify the incentives of the recipients of foreign capital as to how to use the resources transferred. The ranking of the growth effects as given in equation (2) is thus likely to be affected by the degree and nature of interventions concerning the transfer of foreign resources. Against this background, we proceed by evaluating government regulations which influenced capital inflows to Chile in the 1973-87 period.

2. Changes in the Regulative Framework

The analysis of the regulative environment in Chile may be divided into three subperiods, since policies have been revised significantly over the 1973-87 period. From 1973 to 1976 policies concentrated on domestic financial liberalization and privatization. In the same period the liberalization of fdi inflows star-

ted. The opening up towards debt inflows began in 1977 and continued through 1981, and the fdi legislation was further liberalized. From 1982 onwards, the authorities were mainly concerned with the management of the debt crisis and the restructuring of the domestic financial sector.

1973-1976

In order to facilitate the inflow of foreign capital Chile promulgated a new Foreign Investment Law (Decree-Law No. 600) in 1974. Equal treatment of foreign and national firms was aimed at. In addition, Article 16 of Decree No. 1272 was abolished, which formerly restricted the repatriation of capital and interest payments on loans made by foreign investors to national enterprises with a view to capital participation. However, the measures designed to attract new fdi suffered from serious deficiencies. The regulations concerning the applicable exchange rate regime, the withdrawal of capital, the remittance of profits and interest, and taxes were contained in individual fixed-term contracts. This implied considerable uncertainty for investors. The exact terms under which they could invest were unknown at the time of their application. The approval procedures provided the authorities with considerable bureaucratic leeway and involved a significant amount of red tape (BIC, 1987, p. 31). The attractiveness of the new legislation for foreign investors was further reduced, because Chile had acknowledged the Andean's Group's Cartagena Agreement. Transfers of profits, dividends, and interest on foreign capital were limited to 14 per cent per annum. In addition, new foreign direct investment (fdi) in certain industries such as banking was prohibited under decision No. 24 of that agreement[1].

The restrictions and the discriminatory approval system prevented the new Foreign Investment Law from effectively increasing the inflow of fdi. In 1975 the inflow of fdi was only US$ 50 million and it turned even negative in 1976 (Table 1)[2].

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[1] In 1974 Chile allowed fdi in development banks, since those were not covered by the Cartagena Agreement.

[2] The record outflow of fdi in 1974 was due to the nationalization of various mining firms in previous years.

Private debt inflows remained tightly regulated over the period 1973-76. Apart from suppliers' credits only the public sector had access to foreign debt. The share of public sector borrowing in total external debt was above 80 per cent in 1975-76 (Table 2)[1]. External debt increased only modestly if compared to the massive debt inflows during the 1978-82 period. Nevertheless, Chile's external financing structure moved towards a higher debt-equity ratio during 1973-76, since the stock of fdi decreased.

The restructuring of the domestic economy during the years 1973-76 was an important precondition for capital inflows to increase once the entry was liberalized from 1977 onwards. Firstly, new investment opportunities were created for foreign and national firms by dismantling price controls and selling public enterprises to the private sector. Secondly, the domestic financial sector was liberalized without introducing basic solvency requirements[2]. The auctioning off of public banks at favorable conditions was instrumental for the risky concentration of credits later on. Although listing laws restricted the ownership of individuals to 1.5 per cent and of legal persons to 3 per cent of total shares, the private banks were soon owned by the major economic conglomerates (Arellano, 1983, p. 7). Furthermore, portfolio restrictions for banks were abolished. All in all, the reforms yielded a financial sector which could not guarantee the efficient onlending of foreign debt.

The bankruptcies of some finance companies in late 1976 and the solvency problems of a large bank (Banco Osorno) in January 1977 led to massive state interventions. Besides increasing the mini-

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[1] Comparable data for 1973-74 does not exist. However, the public sector accounted on average for more than 80 per cent of medium and long term debt over the period 1973-76.

[2] In 1975 interest rates were liberalized. Legal reserve requirements for demand deposits were gradually reduced from 100 per cent in 1974 to 10 per cent in 1979. Reserve requirements for time deposits were only lowered as late as 1977. In 1974 finance companies were created which were allowed to deal in short term deposit and credit transactions. Until March 1975 those finance companies remained completely unregulated except a required minimum capital of US-$ 300 (Behrens, 1985, p. 332).

Table 1 - Gross Inflow of Foreign Direct Investment into Chile and the Change in Debt Outstanding, 1973-1987 (in Mio. US$)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[a]
(1) Total Debt	259[b]	765[b]	241[b]	-134	481	1463	1820	2600	4458	1611	278	1446	441	70	-289
(2) Foreign Direct Investment	-5	-557[c]	50	-1	21	182	244	213	383	401	135	78	64	60	106
(3) Foreign Portfolio Investment	-7	-8	-6	-6	-7	0	50	0	0	0	0	0	50	262	503
1/2	n.a.	n.a.	4.8	n.a.	22.9	8.0	7.5	12.2	11.6	4.0	2.1	18.5	6.9	1.2	n.a.
1/(2+3)	n.a.	n.a.	5.5	n.a.	34.5	8.0	6.2	12.2	11.6	4.0	2.1	18.5	3.9	0.2	n.a.

[a]Preliminary. -[b]Change in medium and long term debt only. -[c]Capital outflow resulting from the nationalization of the copper industry.

Source: Banco Central de Chile (1984, 1988); IMF, Balance of Payments Yearbook, various issues; own calculations.

Table 2 - The Structure of External Debt in Chile 1975-1987

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Total External Debt (Mio US-$)	4854	4720	5201	6664	8484	11084	15542	17153	17431	18877	19318	19388	19099
- Medium and Long Term (in per cent)	87.9	90.6	86.7	88.9	88.5	84.9	80.8	80.5	85.1	89.9	91.4	91.9	90.0
- Short Term (in per cent)	12.1	9.4	13.3	11.1	11.5	15.1	19.2	19.5	14.9	10.1	8.6	8.1	10.0
Share of Public Sector in Total Debt (in per cent)	83.8	79.7	75.3	70.7	59.7	45.7	35.2	38.8	56.2	65.4	72.9	81.3	85.8
- Financial Public Sector	15.2	13.5	12.2	15.9	15.9	11.4	6.0	9.4	18.7	26.8	29.6	29.5	31.4
Banco del Estado	3.4	2.6	1.8	4.1	3.0	2.8	2.6	4.5	5.0	7.3	7.0	6.7	5.6
Central Bank	11.7	11.0	10.4	11.8	12.9	8.5	3.4	4.9	13.6	19.5	22.6	22.8	25.8
- Non-Financial Public Sector	68.2	65.6	62.2	54.0	42.9	33.7	28.8	29.1	27.1	27.3	31.2	34.2	37.2
Treasury	34.1	34.2	29.8	22.4	15.2	9.6	6.9	6.6	6.5	6.8	10.3	13.5	15.7
Other	34.1	31.3	32.4	31.6	27.7	22.9	21.9	22.4	20.6	20.5	20.9	20.7	21.5
- Private Sector with Public Guarantee	0.4	0.6	0.9	0.7	0.9	0.6	0.4	0.4	10.4	11.3	12.2	17.6	17.2
- Private Sector	16.2	20.3	24.7	29.3	40.3	54.3	64.8	61.2	43.8	34.6	27.1	18.7	14.2
Banks	3.2	3.4	5.9	9.9	17.1	31.5	42.7	39.1	24.1	18.4	14.4	7.5	3.9
Firms and Individuals	13.0	16.7	18.7	19.4	23.2	22.8	22.2	22.1	19.7	16.2	12.7	11.2	10.4

Source: Banco Central de Chile 1988); own calculations.

mum capital requirements for finance companies dramatically the authorities intervened in the Banco Osorno. All depositors received complete compensation for their losses (Arellano, 1983, p. 8). From then on, deposits in national currency were guaranteed by the state up to 100 "unidadas tributarias" (approximately 3.000 US-Dollar; Held, 1988, p. 5). The authorities frequently stressed they would not save other banks. However, their previous interventions made depositors feel that they were de facto fully insured[1]; foreign lenders believed that their credits were, in fact, guaranteed by the state (Diaz-Alejandro, 1985, p. 8).

The financial liberalization in Chile was subject to serious shortcomings. Incentives for solid bank management and an efficient use of funds were not provided. Official guarantees encouraged international banks to lend without screening projects thoroughly. The perceived risk of lending to Chile was reduced. This facilitated the access of the private sector to foreign debt after inflow restrictions were dismantled from 1977 onwards.

1977-1981

Under conditions which did not ensure an efficient use of credits, Chile's private sector was gradually opened to foreign capital flows in 1977-81. After Chile had withdrawn from the Cartagena Agreement in October 1976, a new Foreign Investment Law was enacted in March 1977. The authorization of fdi became far less bureaucratic. The required contract merely specified the phasing of the project[2]. There were no restrictions concerning the degree of foreign ownership and profit remittances. Capital could be repatriated after three years. In general foreign and local firms are given equal treatment implying that most sectors are open to foreign investors[3]. The new fdi legislation applied also to for-

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[1] This perception of depositors is indicated by the fact that they did not use the voluntary insurance offered from 1981 onwards which covered deposits above the amounts guaranteed by the state (Held, 1988, p. 5).

[2] However, no case is known where a deviation from the predeterminant schedule resulted in sanctions against the investors.

[3] Public utilities, communications and areas reserved for state enterprises were exempted.

eign credits which were given to nationals with a view to capital participation. The reforms not only opened additional sectors for fdi but also reduced uncertainty and discriminatory practices. The authorization of fdi no longer required a bargaining process about the terms, because fdi was merely registered.

As concerns debt inflows, the decision to permit banks to borrow abroad for domestic relending under Article 14 was most important. From 1977 onwards the access of Chilean banks to foreign debt under Article 14 improved gradually as various debt margins were augmented (Appendix Table A6). In mid 1979 foreign and domestic debt were given equal treatment; only the overall debt margin restricted the foreign borrowing of financial institutions. Central Bank approval was required, but this did not restrict capital inflows. The central bank did not review loan applications on a case-by-case basis and generally approved every loan. The approval procedure turned out to be merely for registration purposes.

Since 1976 debt inflows into Chile were encouraged by the differential between real interest rates for loans in pesos and dollars. The real interest rate on domestic credits in pesos exceeded the ex-post real interest rate to be paid on loans denominated in US-Dollars by a range of 16 to 48 percentage points (Table 3). Only if ex-ante expectations of devaluations were higher than the actual rate of devaluation these differentials would not induce debtors to borrow abroad. However, the expected devaluation can be assumed to be equal to the actual one (de la Cuadra, Hachette, 1988): Chilean deposits in the United States (in percent of M2) declined steadily until late 1981; this indicates that residents did not perceive the threat of large unexpected devaluations. Furthermore, the premium of the US currency in the parallel exchange market over the official rate did not increase significantly until the last quarter of 1982. Therefore, the interest rate differentials adjusted for exchange rate risks were probably large enough to make borrowers shift their credit portfolio in favour of foreign loans.

Table 3 - Real Interest Rates on Loans in Chile 1975-1983

Year	Real[a] Interest Rates on Credits Denominated in Pesos (1)	Denominated in Dollars[b] (2)	Differentials (1) - (2)
1975	15.6	43.7	-28.1
1976	28.5	-19.4	47.9
1977	25.9	-13.6	39.5
1978	18.6	2.6	16.0
1979	10.6	-9.8	20.4
1980	13.3	-7.5	20.8
1981	33.7	3.7	30.0
1982	40.5	28.4	12.1

[a]GDP deflator used. - [b]Corrected for actual devaluation of the peso against the US-Dollar.

Source: De la Cuadra, Hachette (1988), p. 34.

The size of interest rate differentials can be traced to mainly two factors: very high real domestic interest rates and the overvaluation of the peso[1]. Chile had established an active crawling peg system with a preannounced rate of devaluation until June 1979. However, the rate of devaluation was too small to compensate for the difference of domestic and foreign rates of inflation. Thereafter, the nominal exchange rate was fixed until June 1982. Hence, with high domestic interest rates the exchange rate policies favoured debt inflows by reducing foreign interest rate payments (in terms of pesos) and minimizing exchange rate risk.

[1] The high real interest rates may be partly attributed to the high demand for capital due to the low capitalization of firms and the need for restructuring. Later on the partial segmentation between domestic and international credit markets and distress borrowing of firms also contributed to high real interest rates. For a careful analysis of the determinants of interest rates in Chile, see Zahler (1985).

In sum, government policies encouraged both fdi and debt inflows during 1977-81. The measures resulted in large debt and equity inflows (Table 1). However, debt inflows were on average twelve times as large as the inflow of equity. It was mainly due to the liberalization of private debt inflows that the debt-fdi ratio continued to rise. In 1977 private debtors had accounted for only 22 per cent of Chile's medium and long term debt (Table 2). In 1981 their share peaked at almost 65 per cent. Particularly private banks increased their share by borrowing through Article 14.

1982 to present

Since 1982 Chile has been concerned with restructuring its over-indebted domestic financial sector and managing its foreign debt, whereas the treatment of fdi continued to be liberal. The central bank's decision to install provisional administrators in four commercial banks as well as four finance companies in November 1981 marked a significant change in its attitude towards private external debt. The government took responsibility for servicing the private external debt. Bankruptcies and the loss of creditworthiness induced in particular the central bank to intervene heavily in the private sector. The most important measures were:

- liquidation of some bankrupt financial institutions;
- acquisition of the overdue portfolio by the central bank with a buy-back obligation within ten years;
- extension of subsidized lines of credits[1];
- establishment of a preferential exchange rate for private external debt service between 1982 and 1986[2];
- reform of the General Banking Law in November 1986 in order to reduce the risk-taking of financial institutions and improve public information and control[3].

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[1] See Behrens (1985), pp. 406-411 for details.

[2] The subsidy increased from 11 per cent in the first month of its operation in 1982 to 40 per cent in June 1985. Thereafter it was reduced linearly until its abolition in December 1986 (Ffrench-Davis, DeGregorio, 1987, p. 174).

[3] For a discussion of the changes in the "Ley General de Bancos", see Held (1988).

These measures influenced both the volume and the structure of the Chilean external debt. The public sector contracted new foreign loans and acquired private foreign debt of firms and banks. While total medium and long term debt increased by US$ 4.6 billion over the period 1982-87, the public sector debt jumped from US$ 5,5 billion in 1981 to 16.4 billion in 1987. Hence, the share of the public sector in total debt more than doubled from 37 per cent in 1982 to 85 per cent in 1987 (Table 2). The central bank expanded its share of Chilean foreign debt by 23 percentage points.

Starting in May 1985 the Chilean authorities have tried to reduce the foreign debt by debt-equity swaps, i.e. equity was favoured relative to debt. The legal framework was created with the amendments of the Chilean Compendium of Rules of International Exchange by chapters 18 and 19 in May 1985. Chapter 18 is designed to attract flight capital by converting foreign into local debt. It has been mainly used to refinance local debt (BIC, 1987, p. 32)[1]. While chapter 18 is open to foreigners, it specifically aims at promoting local participation. The investor buys Chilean foreign debt at a discount in the secondary market (currently around 30 per cent). Through an authorized financial intermediary in Chile the investor bids for the authorization to convert the dollar-debt into pesos. The investor offers a discount on the face value of the debt which has stabilized around 16 per cent (BIC, 1987, p. 32). Including commissions the net benefit to the investor turns out to be some 6 per cent. Chapter 18 has been recently suspended but is expected to be resumed in September 1988 (BIC, 1988, p. 206).

Chapter 19 is restricted to foreigners and is designed to facilitate fdi via debt cancellation. The foreign investor buys foreign debt on the secondary market and sells it to the Central Bank in exchange for notes carrying market interest rates. After selling

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[1] Significant capital flight from Chile took mainly place in 1982 and 1983, when the accumulated capital outflow during those two years amounted to US$ 800 million (Arellano, Ramos, 1987).

these notes on the local secondary market at a discount, the net benefit to the investor amounts to 20-22 per cent. Few restrictions exist on the use of funds flowing in under chapter 19. However, the remittance of dividends and capital is restricted in the first four and ten years respectively.

Chapters 18 and 19 effectively reduced Chilean foreign debt by US$ 2,900 million in 1985-87 (Banco Central de Chile, 1988, p. 13). Consequently the structure of external financing changed in favour of equity. Notwithstanding, most of the debt conversions were used to refinance local debt.

IV. The Structure of External Financing and Economic Performance

1. Specification of Hypotheses

From the analyses of regulations governing capital inflows into Chile it can be concluded that the government strongly influenced both the amount and the structure of external financing[1]. Public interventions heavily discriminated between different types of capital inflows. Furthermore, they were shown to have an impact on the relative efficiency of foreign finance. Hardly any restrictions were imposed which might have affected the efficiency of foreign direct investment negatively, once fdi was liberalized; whereas the incentives to use debt inflows efficiently remained seriously deficient during large parts of the period under consideration. Turning to the empirical test of the influence of capital inflows on Chile's economic performance in the following, this finding has to be kept in mind. While the predictions of the principal-agent model on the investment response to different types of external finance remain unaffected, the ranking of growth effects may change due to government regulations.

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[1] For a more rigorous test of this hypothesis, see Appendix 1.

Using annual observations, the following basic equation is estimated for the 1970-86 period:

(3) $X = a_0 + a_1 FDI + a_2 AID + a_3 DEBT$

The endogenous variables to be explained in separate regressions are investment (I) as percentage of gross domestic product (GDP), the domestic savings ratio (DS/GDP) and real annual growth of GDP (GR). The set of explanatory variables includes net foreign direct investment flows into Chile (FDI), aid, and total debt.

According to the theoretical framework outlined above, a non-cooperative equilibrium requires the following pattern of the estimated coefficients.

(4) $a_1 \leq a_2 \leq a_3$.

In addition, individual coefficients should satisfy the following constraints:

(5) a) $-1 \leq a_2 \leq 0$ when the endogenous variable is DS/GDP,

b) $0 \leq a_2 \leq 1$ when the endogenous variable is IR,

c) $a_2 \geq 0$ when the endogenous variable is GR,

d) $a_3 \geq 0$ when the endogenous variable is I/GDP or GR.

Multiple regression analysis is applied to test whether or not the constraints have to be rejected. Additionally, F-tests are employed to test the competing hypothesis that different types of capital inflows have no statistically different impact on the endogenous variables:

(6) $a_1 = a_2 = a_3$.

The importance of discriminating among capital inflows will be evaluated by making pair-wise comparisons:

(7) a) $a_1 = a_2$

b) $a_1 = a_3$

c) $a_2 = a_3$

Restriction (7.a) is the crucial one for determining the kind of equilibrium. While a cooperative equilibrium requires $a_1 \geq a_2$, a non-cooperative equilibrium is characterized by $a_1 \leq a_2$.

Further tests are performed by differentiating between different types of debt inflows. First, it is hypothesized that the impact of debt inflows depends on the type of the capital recipient. Private agents are expected to use credits more productively than the government sector. Therefore, private debt (DEBT-Pr) should have a larger impact on investment and growth than public debt (DEBT-Gv). At the same time a possible substitution between domestic savings and debt inflows should be relatively weak in the case of private debt. The equation to be estimated is then:

(8) $X = b_0 + b_1 \text{ FDI} + b_2 \text{ AID} + b_3 \text{ DEBT-Gv} + b_4 \text{ DEBT-Pr}.$

With respect to individual coefficients the following pattern is expected:

(9) $b_1 \leq b_2 \leq b_3 \leq b_4$.

The restriction (9) embodies both, the test of the non-cooperative equilibrium ($b_1 \leq b_2$) and the distinction of private versus public debt ($b_3 \leq b_4$). The complete constraint as well as pairwise comparisons of coefficients will be tested using F-tests.

The influence of debt inflows may also depend on the type of lender, especially on whether credits are provided by official sources (DEBT-Mu), or private lenders (DEBT-Ba). Credits from official sources are most likely to contain a grant element. Lower than market rates of interest reduce future repayment obligations. This may weaken the incentive to use debt effectively.

(10) $X = c_0 + c_1 \text{ FDI} + c_2 \text{ AID} + c_3 \text{ DEBT-Mu} + c_4 \text{ DEBT-Ba}.$

The coefficients are expected to obey the following pattern:

(11) $c_1 \leq c_2 \leq c_3 \leq c_4$.

2. The Data Base and Methodological Remarks

The main sources for the data were balance of payments statistics and national accounts data. A detailed description of the variables is presented in Appendix 2. Most of the data cover the 1969-86 period. The savings ratio is only available up to 1985. The disaggregation of debt according to the type of creditor does not exist in the case of non-guaranteed private debt, while in the case of public and publicly guaranteed debt it is only available for the years 1970-86.

All estimations were performed using the ordinary-least-squares technique. A maximum-likelihood procedure was applied where results were affected by the presence of first-order autocorrelation of the residuals.

Two period moving averages were used for the capital inflow variables. This is mainly because the impact of capital inflows on economic performance is unlikely to be fully realized in the year when inflows are reported. When economic growth is the dependent variable a lagged impact is most likely. Capital inflows which influence current investment are supposed to affect economic growth in the next period when output-increasing effects of investment materialize. Hence, capital inflows are lagged one period in the case of the growth equation. In the case of domestic savings an additional estimation is performed by applying two period moving averages for the endogenous variable (DSA/GDP). This modification tries to reduce the distortions which are likely to emerge from the well-known problems in measuring domestic savings as the residual item in the national accounts.

3. Empirical Results

The estimated coefficients obtained from equation (3) are presented in Table 5.

Table 5 - Impact of Capital Inflows on Investment, Savings and Growth in Chile, 1970-86

Endogenous variable	a_0	FDI a_1	AID a_2	DEBT a_3	$\bar{R}^2$	D.W.
I/GDP [a]	12.92*** (1.61)	-0.99×10^{-2} *** (0.25×10^{-2})	0.51×10^{-2} (0.42×10^{-1})	0.20×10^{-2} *** (0.35×10^{-3})	0.73	1.59
GR	-12.72** (5.57)	0.19×10^{-1} * (0.93×10^{-2})	0.57 *** (0.16)	-0.72×10^{-2} *** (0.16×10^{-2})	0.62	2.32
DS/GDP	7.21 (5.62)	-0.19×10^{-1} * (0.94×10^{-2})	0.84×10^{-1} (0.16)	0.63×10^{-3} (0.16×10^{-2})	0.11	1.95
DSA/GDP [a]	5.46 (11.46)	-0.15×10^{-1} *** (0.45×10^{-2})	0.11 (0.16)	0.12×10^{-2} (0.71×10^{-3})	0.70	1.16

[a] Corrected for first-order autocorrelation of the residuals. - Standard errors in parentheses. *Significant at the 10 per cent level. **Significant at the 5 per cent level. ***Significant at the 1 per cent level.

Source: Banco Central de Chile (1986, 1988); IMF, Balance of Payments Yearbook, various issues; OECD, Geographical Distribution of Financial Flows to Developing Countries, various issues; own calculations.

In all equations, the estimated coefficients for fdi and aid inflows indicate a non-cooperative relationship, i.e. $a_2 \geq a_1$; whereas the second condition for a non-cooperative equilibrium ($a_2 \leq a_3$) is not fulfilled. However, the comparisons using AID as the point of reference are of limited value, because the AID-variable is only statistically significant in the growth equation. The same is true for the restrictions on the coefficient estimate of aid inflows[1]. Only the positive coefficient in the growth equation allows to confirm the constraint 5.c. ($a_2 \geq 0$).

[1] Neither the expected positive impact in the investment equation (5.b) nor the hypothesized negative relationship between savings and aid (5.a) can be confirmed with statistical significance.

Furthermore, restricting a_3 to positive values (5.d) is rejected in the growth equation.

The differing results for fdi and debt inflows in the first two equations are most noteworthy. If the endogenous variable is the investment ratio, debt inflows have a larger impact than fdi ($a_1 \leq a_3$). This is in line with the non-cooperative pattern hypothesized by the principal-agent model. However, in the growth equation, the opposite result is found, i.e. $a_1 \geq a_3$. The divergence from the predictions of the model can be explained by the regulations which governed capital inflows in Chile. From 1974 onwards, multinational enterprises could invest whereever they wanted. They were concentrated in the most profitable sectors: Over the years 1974-86, 40 per cent of total fdi was realized in the mining sector, which experienced significantly higher real growth than the average of all sectors (Appendix Table A7). This may explain the positive coefficient for fdi in the growth equation. The negative impact of fdi flows on the investment ratio supports the model prediction of a substitutionary relationship between domestic investment and fdi. In spite of the liberalization measures, the credit market in Chile remained segmented (Mizala Salces, 1985). Small and medium-sized firms without links to conglomerates paid significantly higher financial costs in 1977-81. Prior to the liberalization of debt inflows, multinational enterprises had easier access to relatively cheap foreign funds than domestic firms because credits could enter Chile only as part of fdi. Probably, multinationals had access to foreign credits form 1982 onwards, as well. Since financial costs were a substantial part of total costs, multinational enterprises were able to produce at lower financial costs, and thereby crowd domestic firms out. However, due to the superior efficiency of fdi the net impact on growth has been positive.

The regulations concerning the inflow of debt led to opposite results. As hypothesized by the model, foreign credits had a more favourable impact on the investment ratio, but were invested inefficiently. The de-facto guarantee of the state and the lack

of basic solvency requirements weakened the incentive for domestic banks to evaluate the profitability of investment projects and induced private firms to invest in risky projects. Hence, more investment did not lead to higher economic growth.

The test of the alternative hypothesis, according to which economic performance effects are the same for different types of capital inflows, is presented in Table 6. The equations of Table 5 were reestimated including the restrictions (6) and (7). The results were then compared to those of Table 5 using a standard F-test procedure. The most remarkable feature is the rejection of the counter hypothesis (6) claiming that all coefficients yield the same value in all but the first savings equation. Therefore, foreign direct investment, debt, and aid inflows have a different impact with respect to all performance variabes considered.

With respect to the pair-wise restrictions the results are less straightforward, although each restriction is rejected at least once. In the case economic growth, the non-cooperative equilibrium is confirmed by the dismissal of $a_1 = a_2$. But the restriction $a_1 = a_2$ cannot be rejected when the investment or savings ratio is the endogenous variable. The fact that the competing hypotheses cannot be rejected with statistical confidence may be largely due to the insignificant AID-variable. The hypothesis of equal coefficients for fdi and debt inflows is rejected in all but the first savings equation.

The next step is to take a closer look at the impact of different debt inflows. The first test distinguishes private from public debtors (Table 7). The disaggregation did not improve the overall fit significantly. The basic conclusions derived from Table 5 with respect to the relative size of the coefficients for FDI, DEBT and AID still hold. The comparison of b_3 and b_4 confirms hypothesis (9). Private debt has a more favourable impact than public debt ($b_4 \geq b_3$) in all equations. This refers to investment and savings in particular. In the case of the savings equations, it is interesting that only the coefficients for public debt are significantly negative. Obviously, the incentive to substitute foreign credits for own savings is confined to the public sector.

Table 6 - Constraint Tests

Endogenous variable	$a_1 = a_2 = a_3$	$a_1 = a_2$	$a_1 = a_2$	$a_2 = a_3$
I/GDP	F(2,13) = 12.34*	F(1,13) = 0.12	F(1,13) = 20.13*	F(1,13) = 0.55×10^{-2}
GR	F(2,12) = 12.28*	F(1,12) = 11.92*	F(1,12) = 6.70*	F(1,12) = 13.46*
DS/GDP	F(2,12) = 1.79	F(2,12) = 0.40	F(1,12) = 3.55	F(1,12) = 0.27
DSA/GDP	F(2,12) = 6.39*	F(1,12) = 0.63	F(1,12) = 12.46*	F(1,12) = 0.48

Estimated Equation: $X = a_0 + a_1$ FDI $+ a_2$ AID $+ a_3$ DEBT. - A * indicates that the restriction is rejected at the 5 per cent level of significance.

Source: See Table 5, own calculations.

Table 7 - The Debtor Structure and Economic Performance in Chile, 1970-86

Endogenous variable	b_0	FDI b_1	AID b_2	DEBT-Gv b_3	DEBT-Pr b_4	$\bar{R}^2$	D.W.
I/GDP [a]	12.72*** (1.13)	-0.11×10^{-1} ** (0.20×10^{-2})	0.25×10^{-1} (0.31×10^{-1})	0.70×10^{-3} (0.66×10^{-3})	0.19×10^{-2} *** (0.31×10^{-3})	0.78	1.65
GR [a]	14.94*** (4.06)	0.13×10^{-1} * (0.69×10^{-2})	0.65*** (0.11)	-0.97×10^{-2} *** (0.27×10^{-2})	-0.71×10^{-2} *** (0.12×10^{-2})	0.69	1.97
DS/GDP [a]	5.10 (3.33)	-0.23×10^{-1} *** (0.63×10^{-2})	0.20 * (0.96×10^{-1})	-0.42×10^{-2} * (0.20×10^{-2})	0.28×10^{-3} (0.11×10^{-2})	0.44	1.93
DSA/GDP [a]	9.18 ** (4.07)	-0.21×10^{-1} *** (0.49×10^{-2})	0.88×10^{-1} (0.11)	-0.37×10^{-2} * (0.19×10^{-2})	0.56×10^{-3} (0.79×10^{-3})	0.74	1.38

[a] Corrected for first-order autocorrelation of the residuals. - Standard errors in parentheses. *Significant at the 10 per cent level. **Signifcant at the 5 per cent level. ***Significant at the 1 per cent level.

Source: See Table 5; own calculations.

The constraint tests confirm that discriminating between private and public debtors is important (Appendix Table A8). The F-statistics show that the equality of the coefficients of private and public debt inflow ($b_3 = b_4$) is accepted in the growth equation exclusively. The coefficients for private and public debt inflows are significantly different from those of FDI inflows in all equations. A significant difference in the coefficients for private and public debt and aid is only found in the growth equation.

As concerns different types of creditors, Table 8 shows that the overall fit of the equations improved[1]. Debt from private sources has a more favourable impact than debt from official sources ($c_3 \leq c_4$) in all equations, as was to be expected. The grant element of credits from official sources is likely to reduce the incentive to use the funds efficiently. Instead credits are substituted for (government) savings, hence freeing resources for additional consumption.

The comparison between restricted and unrestricted estimates by calculating F-tests somewhat qualifies the estimates of Table 8. The last column of Appendix Table A9 reveals that the restriction implying equal coefficients for debt from both sources is accepted in the first two equations. On the contrary, most other restrictions are rejected if the endogenous variable is GR or DS/GDP. Merely in the investment equation equality of the coefficients is accepted in pairwise tests, whenever the insignificant AID-variable is included.

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[1] Most of the previous results concerning the relative influence of AID, FDI and DEBT are also found when debt is disaggregated according to the type of creditor. However, the positive coefficient for aid inflows becomes statistically significant, if the endogenous variable is DS/GDP. Therefore, constraint 5.a is rejected, which hypothesized a negative value for a_2 in the savings equation.

Table 8 - The Creditor Structure and Economic Performance in Chile, 1970-86

Endogenous variable	c_0	FDI c_1	AID c_2	DEBT-Mu c_3	DEBT-Ba c_4	$\bar{R}^2$	D.W.
I/GDP	12.57*** (1.13)	$-0.14\text{x}10^{-1}$ *** ($0.23\text{x}10^{-2}$)	$0.97\text{x}10^{-2}$ ($0.31\text{x}10^{-1}$)	$0.62\text{x}10^{-3}$ ($0.16\text{x}10^{-2}$)	$0.21\text{x}10^{-2}$ *** ($0.33\text{x}10^{-1}$)	0.75	1.80
GR [a]	-18.06*** (2.81)	$0.18\text{x}10^{-1}$ *** ($0.56\text{x}10^{-2}$)	0.68 *** ($0.77\text{x}10^{-1}$)	$-0.15\text{x}10^{-1}$ *** ($0.44\text{x}10^{-2}$)	$-0.66\text{x}10^{-2}$ *** ($0.83\text{x}10^{-3}$)	0.84	2.70
DS/GDP [a]	5.08** (2.11)	$-0.30\text{x}10^{-1}$ *** ($0.43\text{x}10^{-2}$)	0.13 * ($0.57\text{x}10^{-1}$)	$-0.16\text{x}10^{-1}$ *** ($0.33\text{x}10^{-2}$)	$0.12\text{x}10^{-2}$ * ($0.63\text{x}10^{-3}$)	0.76	2.91
DSA/GDP [a]	7.85** (2.58)	$-0.26\text{x}10^{-1}$ *** ($0.38\text{x}10^{-2}$)	$0.54\text{x}10^{-1}$ ($0.70\text{x}10^{-1}$)	$-0.17\text{x}10^{-1}$ *** ($0.33\text{x}10^{-2}$)	$0.14\text{x}10^{-2}$ ** ($0.52\text{x}10^{-3}$)	0.86	1.43

[a]Corrected for first-order autocorrelation of the residuals. - Standard errors in parentheses. *Significant at the 10 per cent level. **Significant at the 5 per cent level. ***Significant at the 1 per cent level.

Source: See Table 5; own calculations.

V. Summary and Conclusions

The empirical analysis of the impact of different types of capital inflows on Chile's economic performance underlined the relevance of modelling international financial relations on the basis of a principal-agent framework. In the case of non-cooperative relations between the recipient country and its foreign lenders and investors, the investment behaviour of the agent is subject to disincentive problems. Most importantly, equity finance was shown to involve a trade-off between risk reduction and an increase in loanable funds. In Chile, the investment response to foreign equity inflows was significantly weaker than in the case of debt inflows.

However, the empirical results pointed to the weaknesses of the principal-agent model as presented in Chapter II as well. The assumption that different types of capital inflows are perfectly fungible and equally efficient proved to be unduely restrictive in the case of Chile. Government regulations discriminated between equity and debt finance; they encouraged risky and inefficient uses of foreign credits, whereas the liberal treatment of direct investments enabled multinational enterprises to employ foreign capital most efficiently. This had as a consequence that the ranking of growth effects differed from the model predictions. Notwithstanding that debt inflows had a more favourable impact on the investment ratio than equity inflows, the effects of foreign direct investment on economic growth in Chile were more favourable than the corresponding effects of debt. Moreover, it proved to be important to differentiate debt inflows according to the type of debtors and creditors. Debt from public sources and credits raised by public borrowers were less efficiently used than debt from private sources and raised by private borrowers.

Several conclusions emerge from these findings. In order to ensure a more efficient use of debt inflows, public debt should be kept to the minimum. Moreover, the incentives for the private sector to use foreign credits productively must be strengthened. This requires that private debt is no longer de-facto guaranteed by the state. On the other hand, basic solvency requirements must be introduced as a major precondition to prudent banking practices. The solidity of the banking sector has already been improved by the 1986 reform of the General Banking Law which increased public control and reduced the incentive for financial institutions to take excessive risks.

The liberal treatment of foreign direct investment in Chile should be maintained. The crowding-out of domestic investors may be reduced by abolishing remaining disadvantages of small and medium-scale enterprises in raising foreign funds. In particular, the segmentation of financial markets must be overcome.

However, the disincentive effects of fdi and debt on the overall investment behaviour are unlikely to be solved unless Chile succeeds to engage in cooperative relations with foreign suppliers of capital. The institutional framework of international capital transfers is not conducive to a credible precommitment of agents to a certain investment behaviour. It thus depends on the principals' expectations on the future economic course of the agent whether or not they set cooperative terms for capital transfers. The agent may influence those expectations by implementing economic reforms. In the case of Chile, it appears to be most important to mobilize additional domestic savings, to shift domestic absorption towards investment, and to reduce the bias towards risky investments.

Finally, the empirical analysis suggests possible ways as to how to elaborate on the underlying principal-agent model. The government's leverage on the disposal of foreign capital inflows differs according to the type of external finance. Typically, the government agent has direct access to foreign aid and public debt; whereas its influence on the use and effectiveness of (not-guaranteed) private debt and foreign direct investment is less strict. In the capital recipient country, more than one agent exists. The incentive structure as to how to use the transferred resources is likely to differ between public borrowers, private debtors, and private investors attracting equity shares from abroad. The principal-agent model, which is so far restricted to the relations between foreign suppliers of capital and the government of the recipient country, has to be extended by considering those other actors as well. This may be achieved by accounting for internal principal-agent relations within the recipient country. In the case of foreign resources directly channelled to the government, for example, the relations between the country's population as the internal principal of productive resources and the government agent must be analysed more closely, in order to improve the predictive power of the model.

Appendix 1 - Impact of Government Policies on Capital Inflows

The presentation of Chilean policies towards capital inflows indicated that the structure of foreign financing responded to changes in government-imposed regulations. In the subsequent regression analysis the hypothesis of a causal relationship between government regulations and capital inflows is tested in a more rigorous way.

Apart from domestic demand factors, the flows of debt and equity towards developing countries are influenced by international supply factors. As concerns the supply of foreign debt, the overall availability of external credits, i.e. the lender's liquidity position can be supposed to be a major determinant of debt inflows into Chile (d_c). In order to account for this influence, the volume of total debt flow (d_T) to all developing countries is used as an argument in the supply function. The lenders' perception of its riskiness and profitability in the case of Chile is considered to determine this country's potential to borrow abroad. To account for risks, it is assumed that banks base their judgement of country risks on the stock of debt outstanding per capita (D/POP). The higher is debt outstanding per capita, the riskier is additional lending considered to be[1]. The expected profitability of lending to Chile is proxied by the difference between actual real GDP-growth ($\hat{g}_c$) in Chile and average growth in the developing world ($\hat{g}_T$). Assuming a linear relationship yields the following supply function for foreign debt (d_c^S):

$$(12)\quad d_c^S = \alpha_0 + \alpha_1 \, D/POP + \alpha_2 \, (\hat{g}_c - \hat{g}_T) + \alpha_3 d_T$$

Available data does not permit an extensive specification of the demand for foreign credits in Chile[2]. High domestic interest

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[1] In the estimation the debt-per-capita is proxied by the December values of the stock of medium and long term debt per capita of the preceding year. Data on total debt in Chile is not available before 1975.

[2] Particularly, it is not possible to include the differential between domestic and foreign interest rates in the demand function, because the available data covers only a short time period.

rates and low exchange risks generally favoured foreign debt relative to domestic credits during the seventies and early eighties. Therefore, it seems justified to assume that Chilean borrowers preferred foreign debt over domestic debt over the whole period under consideration. Government policies towards debt inflows may thus be considered to be the main factor in limiting demand for foreign credits. To account for changes in government regulations a simple index (REGD) is constructed. Increasing index values are assigned to the liberalization measures presented in Chapter III.2 (Appendix Table A2). The difference between economic growth in Chile and the average of all developing countries is again used to measure the expected profitability of using foreign funds for domestic investment. The demand function may then be written as follows:

$$(13)\quad d_c^D = \beta_0 + \beta_1 \text{ REGD} + \beta_2 (\hat{g}_c - \hat{g}_T)$$

The equation to be estimated is then:

$$(14)\quad d_c = c_0 + c_1 (\hat{g}_c - \hat{g}_T) + c_2 \text{ D/POP} + c_3 \text{ REGD} + c_4 d_T$$

As concerns the supply of foreign direct investment (fdi_c), the expected relative profitability of investing in Chile is likely to figure prominently. Similar to banks, multinational enterprises are assumed to refer to GDP growth in assessing relative profitability. The impact of government policies on the demand for fdi is again proxied by a regulation index (REGI). The rationale maintains that attractive fdi-regulations indicate the desire of Chile to attract more fdi and vice versa. Higher values of REGI reflect Chile's moves towards a more liberal fdi-legislation (Appendix Table A2). Finally, a dummy variable (T) is included to correct for the compensation payments in 1974 after the nationalization of the mining industry[1]:

$$(14)\quad fdi_c = \varepsilon_0 + \varepsilon_1 \text{ REGI} + \varepsilon_2 (\hat{g}_c - \hat{g}_T) + \varepsilon_3 T.$$

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[1] T assumes a value of '1' in 1974 and '0' in all other years.

The figures for debt and fdi inflows are derived from balance of payments statistics. Debt consists of short and long-term net inflows of the official and private resident sector. Portfolio investments were added to foreign direct investments in Chile. This is because investments made via debt-equity swaps are most likely to be recorded as portfolio investments. The equations were estimated using the ordinary-least-squares technique. In the case of fdi, it proved necessary to correct for first-order auto-correlation of the residuals applying a maximum-likelihood procedure. The results are shown in Table A1.

The variables accounting for international liquidity and expected profitability in Chile (relative to the average of all developing countries) have also a positive and significant impact on debt inflows. In the case of fdi expected profitability remained insignificant[1]. In the case of both debt and fdi, the results confirm the hypothesis that capital inflows responded positively when government-imposed entry barriers were lowered.

The regression results thus confirm the descriptive analysis of Chapter III. As hypothesized government regulations affected capital inflows into Chile to a significant degree.

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[1] The profitability of investing in specific sectors may not be correctly reflected in overall GDP-growth rates. During the years 1974-85, for example, 40 per cent of all fdi went into the mining sector. However, the Pearson-correlation coefficient between GDP-growth and growth in the mining sector was only 0.35, indicating that profitability in the mining sector followed a different pattern than GDP-growth rates (Appendix Table A4).

Table A1 - Impact of Government Policies on Capital Inflows 1973-86

Endogeneous variable	Const.	$\hat{g}_C - \hat{g}_T$	D/POP	d_T	REGD	REGI	T	$\bar{R}^2$	D.W.
d_c	201.7 (620.7)	66.3* (30.0)	-2.0 (1.5)	0.03* (0.01)	620.9* (291.6)			60.9	2.11
fdi_c	52.1 (68.8)	-4.9 (5.1)				22.5* (11.1)	-612.2** (112.4)	71.8	1.75

[a]Standard errors in parentheses. *Significant at the 10 per cent level. - **Significant at the 1 per cent level.

Source: Banco Central de Chile (1986, 1988); International Monetary Fund, Balance of Payments Yearbook, various issues; own calculations.

Appendix Table A2 - Indices of Government Regulations for Foreign Credits and FDI

Year	Credits (REGDI)	Ratio of External Debt over Capital and Reserves (Commercial banks)	External Debt under Article 14 over Capital and Reserves	FDI (REGI)	Measure
1970	2			-5	Nationalization of mining firms
1971	2			-5	
1972	2			-5	
1973	2	200		-5	
1974	2			0	Decree Law 600
1975	1	100		0	
1976	1.5	150		0	
1977	1.5	150		5	Withdrawal of Cartagena
1978	2.5	160-250	25-45	5	Agreement; Promulgation of new FDI-Law
1979	4.0	free after July 1979		5	
1980	5.0			5	
1981	5.0			5	
1982	6.0	Active borrowing of public sector to rescue private sector		5	
1983	6.0			5	
1984	6.0			5	
1985	6.0			10	Introduction of chapters 18 and 19.
1986	6.0				

Source: Own compilation.

Appendix 2

Definition of Variables

The Balance of Payments Statistics published by the International Monetary Fund were the source for the following variables:

FDI: FDI inflows include net foreign direct investment in Chile and the subcategories of portfolio investments which are called "other bonds" and "corporate equities". The latter two are mainly included to take account of the debt-equity swaps. The fdi data do not include credits, which multinational enterprises extend to their subsidiaries. These credits are included in debt inflows. Available information shows that debt-inflows under Decree Law 600 accounted only for 16.4 million US-Dollar in 1980. Since this is less than one per cent of the total debt inflow and 7.7 per cent of total fdi inflow, the estimates should not be biased by much. A correction of the balance of payments data is not possible, because information on credits associated with fdi is not available before 1979.

DEBT: Total debt inflows consist of net inflows of "other" long-term and short-term capital into the following three sectors: resident official sector, deposit money banks and "other" sectors. Debt inflows related to public sector bonds are also included.

DEBT-Gv: Government debt is proxied by the sum of net short and long-term debt inflows into the resident official sector and debt inflows related to public sector bonds.

DEBT-Pr: Includes short and long-term debt inflows into deposit money banks and other sectors.

The Geographical Distribution of Financial Flows to Developing Countries issued by the OECD was used for the following:

AID: Consists of grants only.

The available data allow to discriminate among creditors in the case of public and puglicly guaranteed debt only. However, it can be assumed that debt from official sources destined for the private sector is negligible. Debt inflows according to the type of creditor are taken from the World Debt Tables published by the World Bank.

DEBT-Mu: Consists of net flows of public and publicly guaranteed debt from official sources such as multilateral and bilateral agencies.

DEBT-Ba: Net debt inflows from private sources include public and publicly guaranteed credits from suppliers and financial markets plus private, non-guaranteed debt (DEBT-PR).

The values for the endogenous variables come from national accounts data published by the Banco Central de Chile.

GDP: Gross domestic product at current market prices.

I: Gross fixed capital formation.

DS: Domestic savings.

GR: Annual growth rate of real GDP.

Appendix Table A3 - The Structure of External Financing and Economic Growth in Brazil, Chile, and Mexico (in per cent)

	Share of Foreign Direct Investment in Total External Liabilities[a]		Real GDP Growth
	1973	1983	1973-85
Brazil	37	20	5.5
Chile	12	17	1.5
Mexico	23	13	4.8

[a]Stock of fdi as percentage of stock of fdi plus total external debt.

Source: Banco Central de Chile (1988); IMF (1985); Secretaría de Hacienda y Crédito Público (1988); World Bank, World Debt Tables, Washington 1984; own calculations.

Appendix Table A4 - Average Composition of Gross Domestic Product, Debt and Exports in Chile, 1974-81 (in per cent of total)

Sector	Share in GDP (1974-81)	Exports (1974-81)	Debt (1982)
1. Agriculture	6.9	4.6	) 5.6
2. Fishing	0.5	0.2	)
3. Mining	9.0	54.2	12.4
4. Manufacturing	22.7	22.6	19.4
5. Electricity, Gas, Water	2.0	0.0	6.8
6. Construction	5.0	0.0	6.3
7. Trade	16.1	2.1	10.5
8. Transport, Communications	5.8	11.3	3.1
9. Services	31.5	4.9	8.4
10. Others[a]	-	-	27.5

[a]Credits for consumption, financial institutions, unspecified.

Source: Banco Central de Chile (1983); El Mercurio (1983); own calculations.

Appendix Table A5 - Gross Fixed Capital Formation in Selected Manufacturing Industries in Chile (as per cent of Total Manufacturing)

ISIC	Industries	1979	1980	1981	1982	Ø1979-82
	High Labour Intensive					
322	Clothing	1.0	1.0	1.2	0.4	0.9
323	Leather Products, Footwear	0.5	0.2	0.4	0.2	0.3
324	Footwear	0.8	0.5	0.8	0.3	0.6
332	Furniture	0.5	0.3	1.3	-0.3	0.5
390	Other Manufactures	0.1	0.3	0.9	0.06	0.3
	High Capital Intensive					
311/ 312	Food Manufacturing	33.2	26.1	22.6	18.7	25.2
351	Industrial Chemicals	1.7	1.7	0.8	1.6	1.5
369	Nonmetal Mineral Products	1.8	2.6	9.0	20.2	8.4
371	Basic Iron, Steel Inds.	4.4	2.1	3.0	1.8	2.8
372	Nonferrous Metal Inds.	9.0	6.0	11.2	13.4	9.9
	Low Human Capital Intensive					
322	Clothing	1.0	1.0	1.2	0.4	0.9
323	Leather Products, Footwear	0.5	0.2	0.4	0.2	0.3
324	Footwear	0.8	0.5	0.8	0.3	0.6
390	Other Manfactures	0.1	0.3	0.9	0.06	0.3
	High Human Capital Intensive					
313	Beverage Industries	6.3	8.7	5.5	3.2	5.9
351	Industrial Chemicals	1.7	1.7	0.8	1.6	1.5
352	Other Chemicals	3.8	2.6	4.3	3.2	3.5
371	Basic Iron, Steel Products	4.4	2.1	3.0	1.8	2.8
372	Nonferrous Metal Inds.	9.0	6.0	11.2	13.4	9.9
384	Transport Equipment	3.0	0.9	1.0	0.6	1.4

[a]The classification of the industries was taken from Spinanger (1987). Spinanger calculates the factor intensities for five Asian countries and the US. Only those industries which belonged to the same category in at least five out of six country-cases were included.

Source: UN (1985); own calculations.

Appendix Table A6 - Debt Margins for Financial Institutions in Chile (in per cent of Capital and Reserves)

Ratio	Commercial Banks	Development Banks	Finance Companies
Total Debt	20 000	20 000	Increased from 6000 (1976) to 15 000 (1979)
External Debt			
12 - 1973	200	free	not allowed
01 - 1975	100		
06 - 1976	150		
03 - 1978	160		
04 - 1978	160-180[1]	400-500[1]	
12 - 1978	180-215[1]	400-500[1]	
04 - 1979	180-225[1]		
07 - 1979	free	free	
External Debt under Article 14			
01 - 1978	25	free	not allowed
04 - 1978	25-45[1]		25-45[1]
12 - 1978	25-60[1]		25-60[1]
04 - 1979	25-70[1]		25-70[1]
07 - 1979	free		free
Monthly Realization of Debt under Article 14			
10 - 1977	5	free	not allowed
11 - 1978	5 or 2 Mill.US$		
07 - 1979	5 or 1 Mill.US$	5 or 1 Mill.US$	5 or 1 Mill.US$
04 - 1980	free	free	free

[1]Higher percentage permitted if additional credits have a maturity of 36 months or more.

Source: Banco Central de Chile (1981).

Appendix Table A7 - Sectoral Growth and Foreign Direct Investment in Chile, 1969-86

Sector	Real Growth[a] (1969-86)	Correlation[b] with GDP-Growth (1969-86)	Share in Total FDI[c] (1974-86)
Agriculture	1.9	0.18	3.3
Fishing	7.7	0.36	0.0
Mining	3.2	0.35	39.6
Manufacturing	1.5	0.95	25.1
Construction	2.1	0.67	3.8
Electricity, Gas, Water	4.6	0.75	0.1
Transport, Communications	3.4	0.94	0.5
Trade	2.6	0.84	0.0
Services	2.8	0.69	27.6
Total GDP	2.2	n.a.	n.a.

[a]Annual average growth rate. - [b]Pearson correlation coefficient. - [c]Realized fdi.

Source: Banco Central de Chile (1986, 1988), Zabala (1987); own calculations.

Appendix Table A8 - Constraint Tests: Government versus Private Debtors

Endogenous variable	$b_1 = b_2 = b_3 = b_4$	$b_1 = b_2$	$b_1 = b_3$	$b_1 = b_4$	$b_2 = b_3$	$b_2 = b_4$	$b_3 = b_4$
I/GDP	F(3,12)= 12.99*	F(1,12)= 1.25	F(1,12)= 28.97*	F(1,12)= 33.94*	F(1,12)= 0.60	F(1,12)= 0.55	F(1,12)= 4.94*
GR	F(3,11)= 17.72*	F(1,11)= 30.76*	F(1,11)= 7.79*	F(1,11)= 6.97*	F(1,11)= 34.30*	F(1,11)= 34.04*	F(1,11)= 1.46
DS/GDP	F(3,11)= 6.96*	F(1,11)= 4.95*	F(1,11)= 6.52*	F(1,11)= 10.60*	F(1,11)= 4.26	F(1,11)= 4.10	F(1,11)= 9.57*
DSA/GDP	F(3,11)= 6.94*	F(3,11)= 0.94	F(3,11)= 12.99*	F(3,11)= 18.63*	F(3,11)= 0.68	F(3,11)= 0.19	F(3,11)= 6.81*

Estimated equation: $X = b_0 + b_1$ FDI + b_2 AID + b_3 DEBT-Gv + b_4 DEBT-Pr. - A * indicates that the restriction is rejected at the 5 per cent level of significance.

Source: See Table 5; own calculations.

Appendix Table A9 - Constraint Test: Official versus Private Creditors

Endogenous variable	$c_1 = c_2 = c_3 = c_4$	$c_1 = c_2$	$c_1 = c_3$	$c_1 = c_4$	$c_2 = c_3$	$c_2 = c_4$	$c_3 = c_4$
I/GDP	F(3,11)= 13.72*	F(1,11)= 0.56	F(1,11)= 28.42*	F(1,11)= 40.04*	F(1,11)= 0.08	F(1,11)= 0.06	F(1,11)= 0.98
GR	F(3,10)= 42.04*	F(1,10)= 73.35*	F(1,10)= 22.0 *	F(1,10)= 16.35*	F(1,10)= 84.52*	F(1,10)= 81.19*	F(1,10)= 4.38
DS/GDP	F(3,10)= 24.56*	F(1,10)= 7.05*	F(1,10)= 5.66*	F(1,10)= 42.14*	F(1,10)= 6.17*	F(1,10)= 4.65	F(1,10)= 30.70*
DSA/GDP	F(2,10)= 22.11*	F(1,10)= 1.26	F(1,10)= 4.10	F(1,10)= 45.54*	F(1,10)= 1.02	F(1,10)= 0.56	F(1,10)= 32.15*

Estimated equation: $X = c_0 + c_1$ FDI + c_2 AID + c_3 DEBT-Mu + c_4 DEBT-Ba. - A * indicates that the restriction is rejected at the 5 per cent level of significance.

Source: See Table 5; own calculations.

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